

Patient compliance with a hospital no-smoking policy

Frances A Stillman, Michal Warshow, Stella Aguinaga

Abstract

Objective - To examine compliance with a hospital-wide no-smoking policy and tobacco abstinence rates in a selected group of smoking hospital inpatients.

Subjects - 504 patients were interviewed during hospital admission in 1990-1992.

Setting - A 1000 bed urban teaching hospital in Baltimore, Maryland, USA.

Design - A prospective design was used: patients were interviewed about their knowledge of, attitude toward, and adherence to the no-smoking policy within three days of being admitted.

Main outcome measure - Abstinence was assessed by self report and exhaled carbon monoxide levels during hospital admission, and by self report one month after discharge from hospital. Compliance with the policy was measured by self report.

Results - The population was 51% male, 28% black, 63% high school graduates, mean age 52.2 years. The abstinence rate for smokers was 72.8%. Non-abstainers were younger and less likely to have a cardiac diagnosis ($p < 0.001$). Patients in the "precontemplation" readiness stage were five times more likely to smoke during hospital admission than those in the preparation stage ($p < 0.001$). The strongest predictor for non-abstinence was a non-cardiac diagnosis. The compliance rate was 88%.

Conclusions - In a selected group of patients, most complied with the policy by remaining abstinent. Non-abstainers and non-compliant smokers need to be identified and offered different intervention strategies.

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Keywords: hospital no-smoking policy; compliance; intervention strategies

Introduction

As of 1 January 1994, all hospitals in the USA were required by the Joint Commission on the Accreditation of HealthCare Organizations (JCAHO) to be smoke-free. All hospitals must prohibit smoking by patients, visitors, and employees throughout the health-care facility.¹ Developing strategies to promote compliance with these regulations, especially with an ever

changing patient population, poses a challenge for hospital administrators and medical staff.² Some hospitals have instituted bedside smoking cessation programmes for inpatients to promote smoking cessation during the patient's forced abstinence in the smoke-free facility.³⁻⁶ Such a programme was instituted in 1990 at the Johns Hopkins Hospital in Baltimore, Maryland, USA. Information about the hospital's no-smoking policy was given to all inpatients at the time of admission. The policy was also published in the patient handbook. No other procedures were instituted to promote compliance. This study examined compliance with the hospital no-smoking policy in a selected group of inpatient smokers and determined the factors that predicted non-abstinence (smoking) during hospital admission.

Methods

SUBJECTS

Compliance with The Johns Hopkins Hospital's no-smoking policy was assessed in hospital inpatients recruited for smoking cessation counselling ($n = 504$). Inpatients recruited met the following eligibility criteria: regular smoking within one month before admission to the hospital, age 75 years or younger, no current illicit drug use or alcohol abuse, fluency in English, and without diagnosis of a terminal illness. Inpatients were interviewed for this study before they received smoking cessation counselling.

PATIENT SELECTION

A daily computerised search was performed of the patient admission records and the daily patient census. All patients who had identified themselves as smokers at the time of admission were listed, but only patients on the medical and surgical services were eligible to be interviewed. The interview team then reviewed the charts of patients to determine if they were eligible. Patients were not visited if they were too sick, asleep, or out of their room for a procedure. No patient refused to be interviewed. Timing of the interview could not be standardised because of factors outside the control of the interview team; however, the majority of interviews occurred within three days of admission to the hospital.

The Johns Hopkins University School of Medicine, Baltimore, Maryland, USA
FA Stillman
M Warshow
S Aguinaga

Correspondence to: Frances A Stillman, Ed.D., The Johns Hopkins University School of Medicine, Department of Medicine, 550 N Broadway/Room 408A, Baltimore, MD 21205, USA

DEFINITIONS

Compliance with the policy was defined as remaining abstinent from smoking or leaving the hospital buildings to smoke. Non-compliance with the hospital no-smoking policy was defined as smoking inside the hospital during hospital admission. Abstinence was defined as not smoking even one cigarette during the hospital admission. Non-abstinence was smoking one or more cigarettes during the hospital admission.

INTERVIEW COMPONENTS

Patients were interviewed in their rooms about their knowledge of, attitude toward, and adherence to the smoke-free policy. Demographic data were collected and a smoking history was obtained, including number of cigarettes usually smoked per day and readiness-to-quit stage.⁷ An exhaled carbon monoxide (CO) level was obtained on all patients using a Vitalograph monitor. Patients who admitted smoking during their hospital admission were asked where they had smoked and the number of cigarettes they had smoked. Patients were contacted by telephone one month after discharge from hospital and asked to provide a self report on whether they had smoked during their hospital admission.

SMOKING STATUS DURING HOSPITAL ADMISSION

Abstinence during the hospital admission was assessed using three different measures: (1) patient self report at the time of the interview, (2) exhaled carbon monoxide measurement at time of interview (≤ 8 ppm indicative of abstinence), and (3) self report retrospectively at one month after discharge from hospital.

STATISTICAL ANALYSIS

Differences in demographics and smoking history between patients who self reported abstinence during hospital admission and those who did not were examined using Student's *t* test for continuous variables, a χ^2 test for categorical variables, and χ^2 test for linear trends (Epi Info, version 5, USD Inc, Stone Mountain, Georgia, USA). Logistic regression analysis was performed using BMDP (BMDP Statistical Software Inc, Los Angeles, California, USA) to determine the predictors of smoking during hospital admission. Odds

ratios (OR) with 95% confidence intervals (CI) were calculated.

Results

DEMOGRAPHICS OF SAMPLE

Of 504 patients interviewed, 257 (51%) were male, 141 (28%) were African American (most of the rest were white), 318 (63%) were high school graduates; and 257 (51%) had a cardiac diagnosis. The mean age was 52.2 years. Mean length of stay was 8.3 days. These patients were compared with the overall patient population ($n = 29535$) from the medical and surgical services using hospital discharge records for 1990 and 1991, the time during which most of our study patients were interviewed. This population was 57% male, 40% African American, with a mean age of 50.2 years. The mean length of stay was 7.9 days. These data include both smokers and non-smokers.

DEMOGRAPHIC COMPARISON OF ABSTAINERS *v* NON-ABSTAINERS

Table 1 compares demographic characteristics and smoking related variables for abstainers (self reported) *v* non-abstainers (self reported) during hospital admission. Non-abstainers were significantly younger and reported smoking fewer cigarettes per day at baseline than those who abstained. Patients with cardiac diagnoses were significantly more likely to remain abstinent during hospital admission than patients with non-cardiac diagnoses ($p < 0.001$). Blacks were more likely than whites to smoke in the hospital ($p = 0.006$).

ABSTINENCE RATES

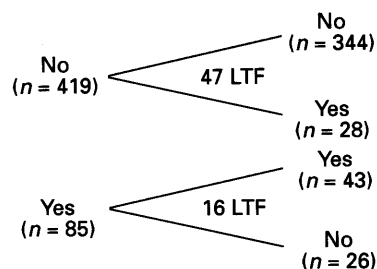
During hospital admission, self report by patients revealed a 83.1% abstinence rate (419/505). Carbon monoxide levels, however, showed 87.3% of patients refraining from smoking. At the one month follow up, 83.9% of the 441 patients who could be reached said they had been abstinent during their hospital admission.

An overall abstinence rate was calculated based on the three abstinence measurements. Patients were considered to have smoked if any one measure indicated that they had smoked during their hospital admission. Abstinence during hospital admission was consistently

Table 1 Demographic variables and smoking history for patients non-abstinent or abstinent (by self report) during hospital admission

Variable	Non-abstinence during hospital admission (n = 85)	Abstinent during hospital admission (n = 419)	p Value
Mean age (years) (SD)	48.1 (12.3)	52.8 (13.1)	< 0.001
Sex - male	51.6	51.6	NS
female	48.4	48.4	
Race - white (%)	57.6	74.2	0.006
black (%)	42.4	25.8	
Married (%)	40.5	52.9	NS
Education	33.8	38.1	NS
< high school (%)			
Mean length of stay (d) (SD)	8.8 (8.9)	8.2 (7.6)	NS
Cardiac diagnosis (%)	26.2	55.3	< 0.001
Mean CO level (ppm)	9.49	4.51	< 0.001
Mean number cigarettes/d (SD)	19.6 (12.4)	23.2 (14.6)	< 0.05

Hospitalisation	One-month follow up
"Have you smoked since you've been in the hospital?"	"Did you smoke while you were in the hospital?"



Self reported abstinence during hospital admission.
LTF, lost to follow up.

measured in 72.8 % ($n = 137$) of inpatients, non-abstinence was consistent in 13.2 %, and there were mixed results in 14.0 % of patients. The figure shows self report of abstinence during hospital admission at the time of the interview and at the one month follow up. The majority of patients (88 %) gave the same response both times. At one month, 92 % of abstainers gave answers that agreed with their self report during hospital admission *v* 62 % of non-abstainers ($p < 0.001$).

KNOWLEDGE OF, ATTITUDES TOWARD, AND COMPLIANCE WITH THE NO-SMOKING POLICY

Thirty one percent of patients surveyed ($n = 156$) had no previous knowledge of the smoke-free policy until the interviewer brought it to their attention; however, most patients (76.8 %) expressed agreement with the policy. There was no difference in either awareness of or agreement with the smoke-free policy based on sex, race, or age of the patient. While no relationship between patient awareness of the policy and abstinence in the hospital was found, a significant difference in agreement with the policy was noted. Patients who remained abstinent were more likely to have stated agreement with the policy than patients who smoked (82 % *v* 62.5 %, $p < 0.001$). Based on self report, 88 % of patients ($n = 444$) were found to be compliant with the no smoking policy either by abstaining or leaving the hospital to smoke. However, only 29 % of non-abstainers ($n = 25$) were compliant and adhered to the policy by going outside to smoke. No significant differences in demographics or smoking history were found between the patients who were non-abstainers but left the hospital buildings to smoke outside and the patients ($n = 60$) who were not com-

pliant and disregarded the policy by smoking inside the hospital. Patients who disregarded the policy reported smoking in the bathroom (82 %), in their beds (11 %), and in stairwells (7 %).

READINESS STAGE

A relationship between "readiness stage" and the patient's smoking behaviour in the hospital was noted. Sixty two percent of patients in the "precontemplation stage" smoked, versus 14 % of contemplators, and 10 % of patients in preparation. A linear test for trend was performed to determine the significance of this relationship. It was found that patients in the precontemplation stage were five times more likely to smoke in the hospital than those in the preparation stage (odds ratio = 5.39, χ^2 for linear trend = 22.908; $p < 0.001$).

PREDICTORS OF SMOKING DURING HOSPITAL ADMISSION

Table 2 presents the results of stepwise multiple logistic regression analysis performed to further examine variables related to patients not remaining abstinent during hospital admission. Variables entered into the logistic regression model were: sex, age, race, stage of readiness, diagnosis, length of stay, and education. Non-cardiac diagnosis and precontemplation stage were the most powerful predictors of smoking during hospital admission. Education did not predict smoking during hospital admission.

Discussion

The majority of smokers in this study remained abstinent during hospital admission. Even excluding the 14 % of patients whose self report of abstinence was questionable, the overall abstinence rate was approximately 73 %. If patients who complied with the policy by going outside the hospital to smoke are included, 88 % of smokers were in compliance with the hospital no-smoking policy. These results are consistent with an earlier Australian study of inpatient smoking behaviour which found that 28 % of inpatients smoked during hospital admission. The earlier study was conducted in a hospital that still had designated smoking areas.⁸ Although hospital admission is an opportunity for health professionals to maximise the benefit of an interruption in smoking by intervening with all smokers, our findings need to be viewed as the most optimistic outcomes of a no-smoking policy. For example, our subjects did not include difficult patients such as current alcoholics and illicit drug users.

Anecdotal reports obtained from health care providers at our hospital indicate that non-compliance with the no-smoking policy is problematic among current illicit drug users and alcoholic patients. In addition, some terminally ill patients (for example, patients on the AIDS service) are also found to be less compliant with the no-smoking policy. The

Table 2 Predictors of non-abstinence during hospital admission: stepwise multiple logistic regression analysis

Variable	Odds ratio	95% Confidence interval	p Value
Non-cardiac diagnosis	3.88	2.10-7.14	< 0.001
Precontemplation stage	2.83	1.56-5.13	< 0.001
Shorter LOS (< 6 d)	2.10	1.21-3.64	0.018
Race (black)	1.98	1.13-3.48	0.020
Younger age (< 53 years)	1.92	1.01-3.34	0.029

LOS, length of stay.

staff also seem to be more reluctant to enforce the policy with certain patient groups, especially those patients who are generally non-compliant with other hospital policies. With regard to *generally* non-complaint patients, staff view non-compliance with the no-smoking policy as a less serious problem than violence, aggressive behaviour, and illicit drug use.

Nurses and physicians reported that they had not been given specific instructions on how to enforce the no-smoking policy or on how to encourage compliance. In addition, nurses and physicians viewed their roles and responsibilities related to enforcement of the no-smoking policy differently.⁹ It also appears that not all smokers were provided with information concerning the smoke-free policy before they were admitted. We found that 31 % of smokers were unaware of the smoking policy. However, it is interesting that there were smokers who were unaware of the policy and still remained abstinent. This may indicate that being a hospital inpatient and experiencing an acute illness are perceived as motivating factors for quitting smoking by some smokers.

Certain patient characteristics were related to abstinence and compliance with the no-smoking policy. Cardiac patients were very compliant with the no-smoking policy and were more likely to abstain during hospital admission. This finding agrees with other studies that have shown that cardiac patients stop smoking at higher rates than the general population.¹⁰⁻¹² Staff and physicians reinforce the benefits of quitting smoking more often with cardiac patients than with non-cardiac patients.¹³ However, our findings highlight the difficulty that non-cardiac patients have with abstaining during hospital admission, which suggests the need for interventions targeted to these patients.

As expected, readiness stage predicted smoking behaviour during hospital admission. A hospital no-smoking policy may be a catalyst for behavioural change in patients who are prepared to quit, but patients in the pre-contemplation stage still pose a challenge for health care providers.

Patients with a shorter length of stay were twice as likely to smoke during hospital admission as those who were in the hospital for longer periods of time. Since length of stay may reflect severity of illness, patients with a shorter admission may not have been as ill and therefore were less likely to use hospital admission as a cue to abstain from smoking. These data suggest that interventions to assist short stay patients to remain abstinent are also in order.

An additional finding was that smokers who abstained from smoking during hospital admission smoked significantly more cigarettes per day, as reported at admission to the hospital (three to four cigarettes per day), than smokers who continued to smoke during hospital admission. An explanation of this finding is that being able to remain abstinent during hospital admission is less a function of addiction

(amount smoked), and more a function of a combination of age related factors and a smoking related diagnosis.

Blacks were twice as likely to smoke in the hospital as whites. This finding is consistent with other reports of lower quit rates in blacks and may also reflect reports that physicians provide less preventive health counselling, such as smoking cessation advice, to African Americans.¹⁴

The results of this study need to be viewed with caution, because our estimates of abstinence probably do not reflect accurately the amount of smoking occurring in a large, urban, hospital inpatient population. While we attempted to establish the representative nature of this convenience sample, other factors may have led to sample selection bias. Current substance abusers were excluded and patients with cardiac diagnoses were over-sampled, because the focus of this study was to assess compliance among a population of patients who were candidates for inpatient smoking interventions. While we could clearly identify cardiac patients, our method of excluding substance abusers relied solely on chart review, which is not the most accurate identification technique.¹⁵ Thus our estimates of abstinence and compliance are representative only of the behaviour of this select group of inpatients and not of the overall patient population at our hospital.

Carbon monoxide monitoring may not be sensitive enough to discriminate abstainers from non-abstainers in an inpatient setting. Because the timing of patient interviews could not be standardised, CO levels may have been raised (≥ 9 ppm) by prehospital smoking in some patients, particularly for those interviews occurring within 24 hours of admission. Conversely, patients who continued smoking minimal amounts may have gone undetected by CO monitoring, especially with the selected cutoff value of ≤ 8 ppm.

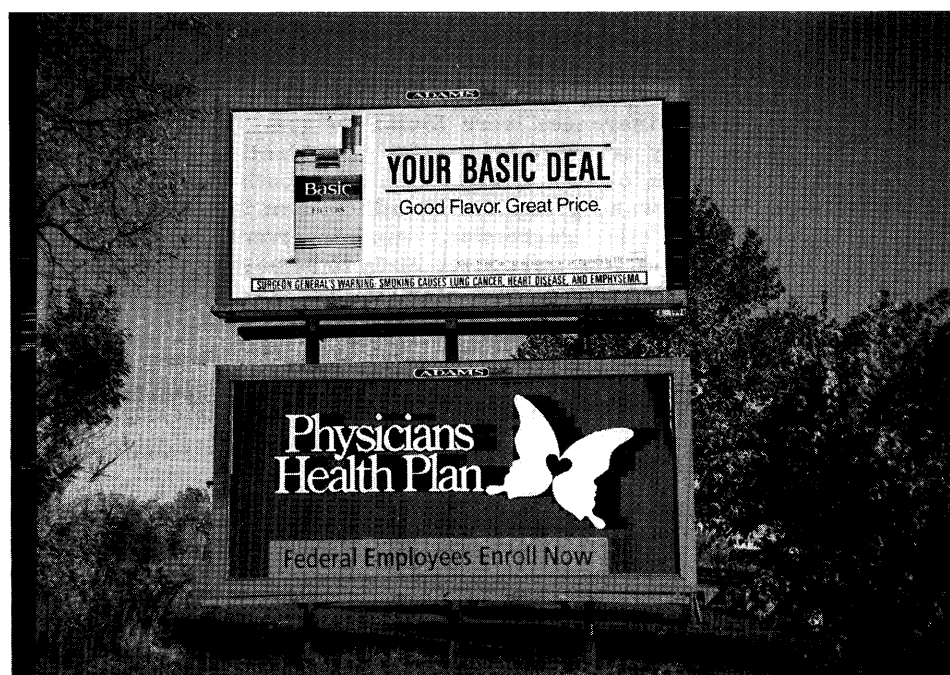
The results of this study indicate that more effort is needed to help patients remain abstinent during hospital admission. Understanding the factors that influence patient compliance is important in assisting medical facilities to maintain their smoke-free environments. Identifying the characteristics of inpatients who are less likely to be compliant with the no-smoking policy and who fail to take advantage of the smoke-free environment to experience abstinence helps target high risk groups who are in greater need of assistance.

THE FUTURE

Hospitals need better strategies to encourage more inpatients to comply with a hospital's no-smoking policy as well as to remain abstinent from cigarettes during hospital admission. All inpatient smokers need to be the focus of intervention strategies targeted at the patient's readiness stage. To encourage compliance with the no-smoking policy, all inpatients should be informed of the policy upon or before admission. The period of forced abstinence in a hospital can become an opportunity for long

term cessation from smoking. A health educator/smoking cessation counsellor could help patients who have difficulty complying with the no-smoking policy, as well as help patients stop smoking permanently.

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